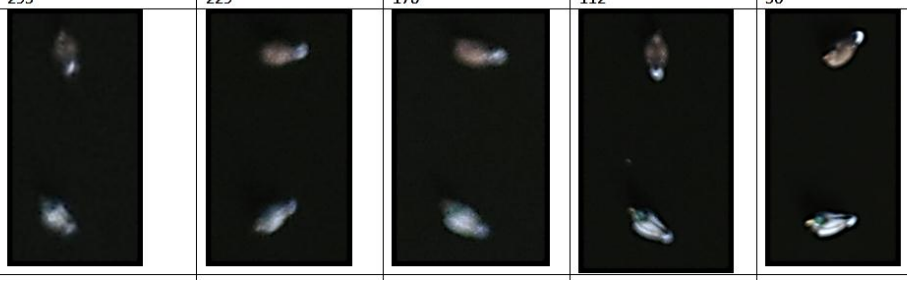
Waterfowl Census and Species Determination from small Unmanned Aircraft Systems

Three proof-of-concept low altitude unmanned aerial missions were conducted in November and December of 2013, specifically aimed at investigating new methodologies for the U.S. Fish and Wildlife Service to conduct waterfowl census counts and determination of specific species type. Traditionally, waterfowl counts have been conducted from land by biologists and refuge managers trained to make visual estimations or from expensive and dangerous low level aerial flights in manned aircraft. With the introduction of small unmanned aircraft systems equipped with light-weight cameras and sensors, a safer and more cost-effective methodology of accomplishing the tasks is possible.

Four different locations were investigated including the Ruby Lake National Wildlife Refuge, the Kern and Pixley National Wildlife Refuges, and the Tomalas Bay area of the Pt. Reyes National Seashore. Utilizing the Honeywell T-Hawk Unmanned Aircraft System and a Canon S100 camera, the waterfowl were photographed at various flight heights between 75 to 400 feet to determine an overall population count and to test for visual identification and sampling of the waterfowl to see if specific bird species could be distinguished.

15 cm ZOOM					
Elevation (MASL)	158	138	120	102	85
M above ground	90	70	52	34	17
Ft above ground	295	229	170	112	56
Mallard					

Determination of mallard ducks within a group of various waterfowl using the Canon S100 camera at different flight heights on-board the T-Hawk Unmanned Aircraft System.

Waterfowl population estimates can be determined using the GoPro Hero3 camera on-board the T-Hawk Unmanned Aircraft System

The proof-of-concept missions demonstrated that small unmanned aircraft systems can be an additional safe and effective tool to assist in the process of gathering information on migratory birds numbers, as mandated by the Migratory Bird Treaty Act, with lower risk to the U.S. Fish and Wildlife personnel and at a lower cost.